ABSTRACT

A method and apparatus are disclosed for reducing the complexity of reduced state sequence estimation (RSSE) techniques for a given number of states while also reducing the critical path problem. The signal energy of a pulse that has gone through a minimum-phase channel is concentrated in the initial taps. A communications channel is represented using a discrete time model, where the channel impulse response has a memory length, L, denoted by $\{f_k\}_{k=0}^{L}$, where f_k is the coefficient for channel tap k. Taps one through U are referred to as the initial taps, and taps U+1 through L are referred to as the tail taps, where U is a prescribed number. The less significant tail taps are processed with a lower complexity cancellation algorithm, such as a decision-feedback equalizer (DFE) technique, that cancels the tail taps using tentative decisions. Thereafter, only the more significant initial taps are processed with a reduced state sequence estimation (RSSE) technique. The DFE technique initially removes the intersymbol interference associated with the tail taps, then the RSSE technique (or M-algorithm (MA)) is applied only to the more important tail taps. Taps one through U are processed using the RSSE technique and taps U+1 through L are processed with the lower complexity decision-feedback equalizer (DFE). A receiver is disclosed that includes a tentative decision/tail processing circuit, such as a decision-feedback equalizer (DFE) technique, for processing the less significant tail taps and an RSSE circuit for processing the initial taps.

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